



# Installation Guide for Cementitious Structural Grout

## TDS 430

### Preparation of Concrete Substrate:

The base slab on which the cementitious structural grout (e.g. L&M™ CRYTEX™ or L&M DURAGROUT™) is to be placed should be clean and soaked with clean water, preferably by ponding, for 18 to 24 hours. Just prior to grouting, the water should be removed and the surface dried with clean rags or compressed air, free of oil and other lubricants, leaving only a damp film. The best bond is achieved when the top surface of the concrete has been removed by chipping to expose large amounts of coarse aggregate. The surface preparation may require removing the surface to a depth of 1/4" (6mm) or more.

### Preparation of Baseplates and Sole Plates:

All baseplates, sole plates and concrete surfaces to come in contact with grout should be free of grease, oil, laitance and other bond inhibiting debris. Baseplates and sole plates should be shimmed and brought into proper alignment prior to placement of the grout. In complicated baseplate configurations where entrapment of air is possible, the strategic placement of air relief holes, approximately 1/8" (3mm) in diameter through the baseplate may be necessary. Note: Before any holes are drilled, prior approval must be obtained from the appropriate authority.

### Forming for Grout Placement:

A sturdy, watertight form should be built around the area to be grouted. Formwork should be designed to ensure free flow of the grout under the baseplate during placement in order to prevent the creation of air pockets. The height of the formwork should be sufficient to allow for complete gravity fill under the plate. Anchor all forms securely to prevent movement during grout placement and curing. At the point where the grout will be introduced into the form, a head box or funnel should be mounted approximately 6 – 8" (150-200 mm) higher than the baseplate to allow proper gravity filling of the formed area.

### General Preparation:

Have all necessary tools and materials close to the work area to permit rapid and continuous placement of the structural grout. To promote efficiency and accuracy, a batch of a given size (number of bags) should be selected for use throughout the project. A container should be filled with water for the batch size and the liquid level marked for use thereafter. Sufficient personnel should be available to ensure an uninterrupted supply of mixed structural grout material.



## Mixing Large Grout Batches:

To ensure grouting without interruption due to mechanical breakdown, it is good practice to have at least two suitable mortar mixers.

## Tools and Equipment:

- For small batches, a variable speed electric drill fitted with a jiffy type mixer.
- For large batches, a clean, dry mortar mixer free of mortar with tight-fitting rubber wipers is preferred. Always have an emergency backup system available. Concrete mixers are not recommended as they will not properly mix the grout.
- For transporting large amounts of grout, have a clean, dry wheelbarrow.
- Buckets
- Rubber gloves and goggles for protection.
- Graduated container for measuring mixing water.
- Source of clean water.
- A grout pump (if grout is to be pumped).

## Choosing the Right Equipment:

**Do not use a rotary drum concrete mixer to mix large batches of non-shrink, cementitious grout.**

Rotary drum, concrete mixers do not produce, by themselves, enough mixing shear to properly activate all flow enhancing admixtures of a grout. Because of the lack of mixing energy, grout that is mixed in a concrete mixer typically appears to need more than the required water to obtain a workable consistency and flow. The increase in mixing water will reduce the strength and may affect the non-shrink properties of the grout. Mortar mixers, on the other hand, provide good mixing shear and are very effective in mixing non-shrink, cementitious structural grouts and mortars uniformly throughout the batch.

Use only clean mortar mixers. Remove any hardened concrete or mortar. Ensure that the rubber mixing blades are in good working order.

1. Prior to mixing the first batch of grout, wash out and "butter" the mixer. Mixing one bag of grout with maximum water does this. After mixing discard the grout, leaving a grout coating in the mixer. **Do not wash this coating out of the mixer or wash out the mixer between batches.** If the mixer is not buttered, the first batch of grout will be stiff and out of proportion.
2. Determine the number of bags to be mixed at one time. Mix only the amount of grout that can be placed within the allowable working time, or as indicated on the bag.
3. Refer to instructions on product bag for water requirements.
4. For fluid consistency, put into the mixer about 3/4 of the required water, then add the structural grout slowly into the operating mixer (being careful not to overload the mixer to the point of stalling).
5. Mix the structural grout to a doughy state.



6. Continue to mix until all dry material is thoroughly wet. After all lumps have disappeared, add the remaining water to desired consistency.
7. Continue to mix for a total of 3 to 5 minutes or until a uniform consistency is obtained.
8. For consistencies stiffer than fluid, add the total amount of water at the beginning of the mixing cycle.
9. Continue to mix for 3 to 5 minutes or to a uniform consistency. Recommended efflux time for a fluid consistency grout, as measured by flow cone (ASTM C939 or CRDC-61 l), should be between 20 to 30 seconds.

### **Mixing with Pea Gravel:**

For grouting depths of 100 mm (4") or less, L&M™ cementitious structural grouts (e.g. L&M CRYSTEX™, L&M DURAGROUT™, etc...) should be used as packaged with only the addition of water. For depths of more than 4" (100mm), it is recommended that up to 50% by weight of 3/8" (10mm) pea gravel or pea stone be added to the neat grout. Due to the nature of L&M grouts, the addition of 3/8" (10mm) aggregate as specified below does not substantially affect the performance or placement consistency of the grout.

1. Choose a clean (free of organic material) well-graded 3/8" (10mm) aggregate.
2. Soak in clean water for approximately 24 hours prior to mixing with grout.
3. Drain off excess water prior to mixing. The total mixing water for the batch shall be reduced by the amount of free water in the aggregate, if measurable.
4. Follow normal mixing procedures for neat grout. After all water has been added and grout has come to uniform consistency, add approximately one 5 gallon (19 L) bucket of aggregate for every 55 lb. (25 kg) bag of structural grout.
5. Continue to mix until the pea gravel is thoroughly dispersed throughout the grout.

### **Mixing Small, One Bag Batches:**

In field applications, in order to receive full benefit of the properties of L&M™ non-shrink grouts, batches of less than one bag should not be mixed.

### **Hand Mixing of Small Batches:**

This method is intended for mixing of grout for small cosmetic patching applications only, where strength and non-shrink characteristics are secondary. Place small quantity of water into a container, add grout and mix by hand using a spoon or paddle until desired consistency is achieved.

1. Use a clean, 5 gal. (19 L) bucket or suitable container for mixing.
2. Using a marked pitcher or beaker, carefully measure the water required for the consistency desired, following instructions on the bag.

3. Add the pre-measured water to the large container.
4. Slowly pour the structural grout into the container while mixing with a low RPM setting on a variable speed, high torque, electric drill with a chuck capacity of not less than ½” (13mm). The actual mixing device shall have paddles or impellers capable of thoroughly blending stiff mortar. (Epoxy compound or jiffy mixers (18-B) are suitable). Care should be exercised not to form a downward-flowing vortex, as this can cause entrapment of air, resulting in a porous bearing surface under the baseplate. The use of a reversible drill is recommended, set to the reverse setting, in order to prevent pulling air into the mix.

## **Placement of Structural Grout**

### **Flowable to Fluid Consistency**

Whenever possible, fill anchor bolt holes or anchor sleeves first. (19-A) In order to avoid air pockets and ensure complete filling of the cavity between baseplate and concrete foundation, the grout should be placed from one side only, and placement should be completed without interruption. Grouting from two directions can entrap air and create undesirable air voids under the baseplate.

### **Grouting Using a Head box:**

When a head box is used to place grout, the head box should be kept full of grout at all times during the grouting procedure. It is the weight of the grout in the head box producing a hydraulic head pressure that forces the grout to move under the baseplate. If the head box is allowed to become empty, and then refilled, the additional grout can entrap air, creating an undesirable void under the baseplate.

### **Placing Grout by Pump:**

If grout is being placed by pump, the discharge end of the hose should be placed at the most distant point to be grouted. As the grouting continues the hose should be withdrawn, making sure the discharge end of the hose remains in the mass of the grout. If the discharge end of the hose is removed from the mass of the grout, the grout will flow in two directions, causing undesirable voids under the baseplate. Do not overwork or over-vibrate a fluid grout, as this may cause segregation or bleeding. Under no circumstances should grout be re-tempered with water or other additives. If vibrating machines or equipment are being used nearby, shut them down until the grout has hardened.

For a simple test to determine undesirable vibrating in the area to be grouted, we recommend the following: Place a pan of water on the baseplate to be grouted. If ripples can be seen in the water, then the effect of vibration is too high and nearby equipment should be shut down before grouting. The equipment should remain shut down until the grout mass has hardened.

### **Dry Pack Grouting:**

L&M's Premier grout may be used as a dry pack grout in areas where flowable material cannot be used. It is essential that the material be thoroughly mixed with no lumps. (At the center of each lump is dry material that does not have sufficient water for hydration. This may result in a grouting material that has low and inconsistent compressive strength and a tendency to crumble under the baseplate). When properly mixed, the dry-pack structural grout must have uniform moisture content and be readily compacted into the grout void,



in much the same way as damp sand. Please note that L&M CRYSTEX™ is not recommended for dry pack applications because of its extended set and high flow characteristics.

## **Cold Weather Grouting:**

### **Mixing and Placing Procedures**

Because structural grout tends to set more slowly in cold weather (45 - 65°F [7 - 18°C]), the first 24 to 48 hours are critical. When grouting in cold weather, modify the basic procedures as follows:

1. Store grout bags in a warm building for 48 to 72 hours prior to grouting.
2. Heat mixing water to no more than 95°F (35°C). Mixing water temperatures greater than 95°F (35°C) could cause flash set; mixing water temperatures lower than 90°F (32°C) will have little effect on raising the grout temperature. The temperature of the grout mixture at time of placement should be at least 45°F (7°C) and no higher than 90°F (32°C).
3. Where possible, baseplates and concrete foundations to be grouted should be warmed to a minimum of 40°F (4°C) and rising.
4. The mixer should be warmed with hot water prior to mixing the first batch of grout.

**NOTE: Do not add concrete accelerators or other admixtures.** Only water and pea gravel may be added to the grout

### **Post-placement Protection:**

Structural grout should be cured at temperatures of not less than 50°F (10°C) for at least 48 hours and should not be exposed to freezing temperatures for an additional three days, or until compressive strength of 4,000 psi (27.6 MPa) is reached.

## **Hot Weather Grouting:**

### **Mixing and Placing Procedures**

In hot weather, over 95°F (35°C), grout may rapidly lose workability, causing flash setting and loss of compressive strength. To overcome these problems, modify the basic procedures as follows:

1. Store grout bags in a cool, shaded (preferably indoor) location until time of use.
2. Prior to mixing, cool mixer with chilled water. Use chilled mixing water as close to 32°F (0°C) as possible. This can be easily accomplished by placing block ice in a 55 gal. (208 L) drum of water. Do not allow ice to be added to the grout use only the chilled water. At the time of placement, the desired grout temperature should be 80°F (27°C) or below.
3. Areas to be grouted must be thoroughly saturated with cool water for 18 to 24 hours prior to grouting. Just prior to placing the grout, remove standing water with compressed air, or mop with clean rags, leaving only a damp film. Surface must be free of oil and other lubricants.

4. Locate mortar mixer in a shaded area as close to the grouting site as possible.

## **Curing and Early Protection of Exposed Grout Surfaces:**

As soon as grout has reached final set, apply clean, wet rags or soaked burlap to exposed surfaces to inhibit evaporation of moisture due to high ambient temperature. Cover with plastic sheeting to delay evaporation. Delay application of curing compound for 24 hours after final set. Exposed surfaces should be moist cured for a minimum of three days. Dry pack grout installations may require a longer wet cure period, depending upon job-site conditions. Following moist curing, apply a high-solids, membrane curing or curing/sealing compound such as L&M™ DRESS & SEAL™.

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